Revised

CLAIMS

1. Method for forming a microstructure, comprising: depositing a seed material on a substrate; growing a nanotube from the seed material; depositing microstructure material on the substrate to embed the nanotube in the microstructure material; and, detaching the substrate to release the microstructure.

2. Method as claimed in claim 1, comprising shaping the microstructure material prior to release of the microstructure.

3. Method as claimed in claim 1 or claim 2, wherein the microstructure material comprises any one of a polymer, a dielectric material, a metal, and polysilicon.

4. Method as claimed in any preceding claim, wherein the substrate is formed from any one of Silicon, glass, quartz, ceramics, and plastic.

5. Method as claimed in any preceding claim, wherein the seed material comprises alternating layers of a first and second precursor materials.

6. Method as claimed in claim 5, wherein the first precursor material comprises a fullerene material, and the second precursor material comprises field sensitive material.

7. Method as claimed in claim 6, wherein the fullerene material comprises any one of Carbon 60 and Carbon 82, and the field sensitive material comprises any one of Ni, Co, Fe and Mo.

8. Method as claimed in claim 7. Wherein the fullerene material comprises Carbon 60, and the field sensitive material comprises Nickel.

9. Method as claimed in any preceding claim, wherein the growing of the nanotube comprises: heating the substrate in vacuum conditions; and applying a field to the substrate.

10. Method as claimed in claim 9, wherein the vacuum conditions comprise oxygen pressure greater than 10^{-5} mbar.

11. Method as claimed in claim 9 or claim 10, wherein the heating comprises elevating the temperature of the substrate to between 900 and to 1000 degrees Centrigade.

12. Method as claimed in any of claims 9 to 11, wherein the applied field comprises a magnetic field.

13. Method as claimed in claims 12, wherein the magnetic field is applied orthogonally to the surface of the substrate.

14. Method as claimed in claim 13, wherein the magnetic field is greater than or equal to 50 Gauss.

15. Method as claimed in any of claims 9 to 11, wherein the applied field comprises a electric field.

16. Method as claimed in claims 14, wherein the electric field is applied orthogonally to the surface of the substrate.

17. Method as claimed in any preceding claim, wherein the detaching comprises depositing a sacrificial layer on the surface of the substrate prior to deposition of the cantilever material; and immersing the sacrificial layer in an electrolyte after deposition of the microstructure material.

18. Method as claimed in claim 17, wherein the sacrificial layer comprises an anode sub-layer and a cathode sub-layer.

19. Method as claimed in claim 18, wherein the anode sub-layer comprises any one of Al, Zn, Cr, Fe, and Co, and the cathode sub-layer comprises a noble metal.

20. Method as claimed in claim 19, wherein the cathode sub-layer comprises any of Au, Pd, Pt, Ag, and Cu.

21. Method as claimed in any preceding claim, wherein the depositing of the seed material comprises: depositing a photo-resist layer on the substrate; forming an aperture in the resist layer; masking the substrate with a resist layer to locate the seed material at a site on the substrate defined by the aperture; and, removing the resist layer to remove surplus seed material.

22. Method as claimed in claim ~~21~~ 21, wherein the forming of the aperture comprises under-etching the resist layer to produce a cavity in the resist layer.

23. Method as claimed in any claim preceding claim ~~22~~, comprising forming a tip image in a substrate to produce a mold for receiving the microstructure material.

24. Method as claimed in claim ~~24~~ 23, wherein the forming of the tip image comprises: depositing a photo-resist layer on the substrate; forming an aperture in the photo-resist layer; and, under etching the substrate beneath the photo-resist layer to create the tip image.

25. Method as claimed in claim ~~25~~ 24, wherein the depositing of the seed material comprises: masking the substrate with the resist layer to locate the seed material in the apex of the tip image; and, removing the resist layer to remove surplus seed material.

~~26. A microstructure comprising a body portion and a nanotube~~ embedded in the body portion.

27. A microstructure as claimed in claim 27, wherein the body portion comprises a cantilever beam and the nanotube is embedded in and extends laterally from one end of the beam.

28. A microstructure as claimed in claim 27 or claim 28, wherein the body portion comprises a laterally extending tip and the nanotube is embedded in and extends from the apex of the tip.

29. A microstructure as claimed in any of claims 27 to 29, wherein the body portion comprises any one of a polymer, a dielectric material, a metal, and polysilicon.

30. A micromechanical sensor comprising a microstructure as claimed in any of claims 27 to 30.

31. A data storage device comprising an array of sensors as claimed in claim 31 for reading or writing data onto a ~~storage surface.~~